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Suppressor Function of Peripheral Blood Mononuclear Cells in Patients with Psoriasis Vulgaris

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The suppressor activity of peripheral blood mononuclear cells was investigated in 25 patients with psoriasis vulgaris. In the psoriatic patients the suppressor activity was found to be significantly lower than in the control group, which suggests that the weak suppressor activity may play a role in the pathogenesis of this disease.

Several studies have been carried out recently to investigate the immunological processes which play a role in the pathogenesis of psoriasis vulgaris (PV), and various disturbance of immune function have been observed. It is now well known that suppressor T lymphocytes have an important function in the regulation of the immune response [1,2]. In patients with PV an alteration of T cell suppressor function was suspected by Cormane, Hunyadi, and Hamerlinck and by Guilhou, Meynadier, and Clot [3,4]. Therefore, it appeared to be appropriate to investigate the suppressor function in patients with PV.

Various methods are employed to measure the suppressor activity of peripheral blood mononuclear cells. Bresnihan and Jasin [5] observed that the peripheral blood mononuclear cells (PBMC) stimulated by a suboptimal concentration of concanavalin A (Con A) after 24 hr of incubation at 37°C exhibited significantly more ^{3}H-thymidine intake and secretion of newly synthesized protein than the cells stimulated without preincubation. These differences were interpreted as an indication of a depletion of short-living suppressor cells during the incubation period. Based on these observations these investigators developed a method to detect the suppressor function of human PBMC, which is widely used in clinical studies. This method was used here to investigate the suppressor activity of PBMC in patients with PV.

MATERIALS AND METHODS

Patients

Twenty-five untreated patients (ages 21–49, suffering from PV of the plaque type, duration of 7–16 yr) were involved in the present investigation. None of these patients exhibited other diseases. Prior to this study the patients had never received either corticosteroids or immunosuppressive drugs. A group of 43 healthy adults (age 18–48) was used as a control.

Culture Conditions and the Measurement of DNA Synthesis

These were carried out according to the method described by Bresnihan and Jasin with some modification (5,6).

Briefly, leukocytes were isolated by $1 \times g$ sedimentation from blood containing citrate at room temperature. Subsequently the PBMC were separated on Ficol-Hypaque gradients. The washed PBMC were resuspended in Parker 199 tissue culture medium, supplemented with L-glutamine and 10% heat inactivated fetal calf serum. Test cultures were set up in triplicate, each tube containing 3×10^6 cells in 3 ml medium. The lymphocytes were stimulated with 1 μg/ml Con A (Serva) either at the initiation of the culture or after 24 hr period of incubation at 37°C.

The incorporation of ^{3}H-thymidine was assayed adding 1.0 μCi/ml ^{3}H-thymidine (1.0 Ci/mMol) to the cultures for a 20-hr period, 76 hr after the addition of Con A. The radioactivity was measured in a Tri-Carb (Packard) scintillation counter. The amount of ^{3}H-thymidine incorporation into the cells was expressed as: total cpm/10^6 lymphocytes.

The suppressor index (Si) was calculated using the following formula:

$$\text{Si} = \frac{\text{cpm}/10^6 \text{ lymphocytes/preincubated for 24 hr/}}{\text{cpm}/10^6 \text{ lymphocytes/stimulated at zero hr/}}$$

Base lines of the unstimulated cultures were subtracted from the counts of the stimulated cultures.

Statistics

The significance of the difference was calculated by the Student's *t*-test.

RESULTS

In the control group the Si yielded a range of 9.6 to 1.1 and a mean ± SEM of 3.89 ± 0.52. In the group of patients with PV the Si varied from 5.0 to 0.8 with a mean ± SEM of 2.32 ± 0.24 (Figure). The difference between the 2 groups proved to be statistically significant ($p<0.05$). No relationship was found between the extent skin lesions and the Si.

DISCUSSION

Suppressor cells have been found to have an important role in immunological tolerance, antigenic competition, genetic control of the immune responses, allotype suppression and the regulation of the response to antigens. Disorders involving suppressor cell activity play a role in the pathogenesis of some humoral immunodeficiencies, anergy associated with fungal infection, several autoimmune diseases and in the immunological enhancement of tumor growth.

Recent evidence obtained from studies with animals suggesting that the loss of effective suppressor T cell function can lead to autoimmune diseases. The results of investigations on these animal models of autoimmunity suggest that similar processes could be characteristic of human autoimmune phenomena as well [1,2].

We utilized the technique described by Bresnihan and Jasin [5] to detect the suppressor function of PBMC in patients with PV. This method is based on the observation that a significantly higher DNA and immunoglobulin synthesis are detectable in cultures preincubated for 24 hr at 37°C before stimulation with suboptimal concentration of Con A than in cultures without preincubation. Since the increased responsiveness of the preincubated cultures could be inhibited by the addition of a small number of cells previously activated by Con A, it was suggested that the enhanced reactivity acquired in preincubated cultures represents a loss of short lived suppressor cells. In this study, investigating the control group, the ^{3}H-thymidine incorporation detected in the cultures preincubated for 24 hr was found to be 3.89 times higher than in cultures stimulated at zero hour. These differences are similar to those observed by Bresnihan and Jasin [5].

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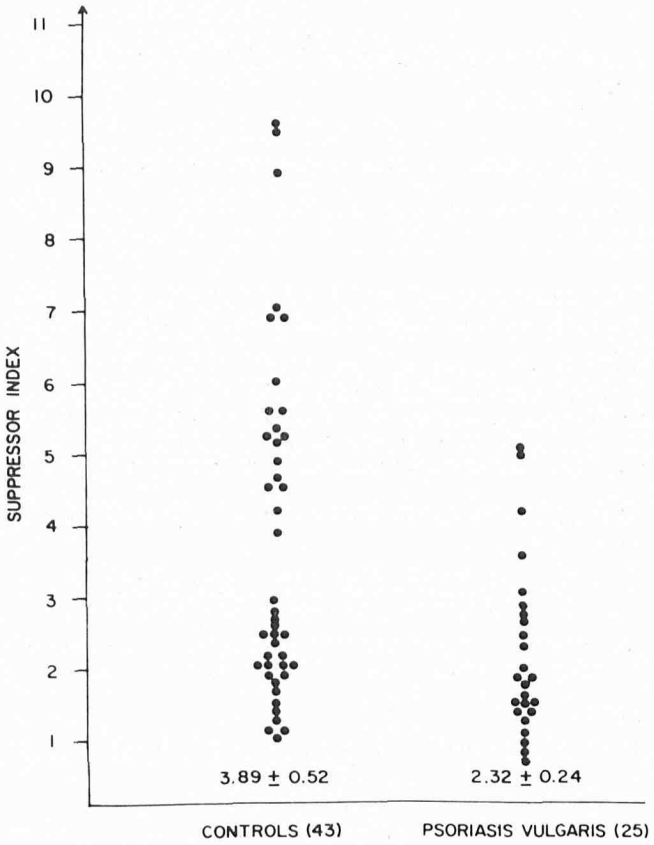
Abbreviations:
Con A: concanavalin A
PBMC: peripheral blood mononuclear cells
PV: psoriasis vulgaris
Si: Suppressor index



Distribution of suppressor indices in patients with psoriasis vulgaris and healthy controls. The difference between the 2 groups is significant, $p < 0.05$.

Immunological investigations of patients with PV presented an elevated serum and secretory IgA level, and in some patients an increase of serum IgE level [7–9]. It is of interest that both the IgA and IgE production is thymus dependent [10]. An antinuclear antibody was demonstrated to be present in the eluate of lymphocytes and granulocytes from patients with PV by Cormane, Hunyadi, and Hamerlinck [11]. In other investigations, complement-binding antibodies reactive with the membrane of the horny layer cells were shown to be present in the sera of patients with PV [12]. These antibodies were found to be deposited with complement (C_4 and C_3) in the upper layer of psoriatic scales, but not in the clinically uninvolved skin of these patients [13]. It is assumed, therefore, that stratum corneum antigens have no contact with the immune system or that the alteration of their antigenicity is necessary for immune complex formation [14]. These disorders could be due to an apparent increase in B-cell activity and could also be related with the significantly decreased number of peripheral blood T lymphocytes as suggested by Cormane, Hunyadi, and Hamerlinck, Glinski et al, and Guilhou, Clot, and Meynadier [3,15,16].

In the present study the suppressor activity of peripheral blood mononuclear cells was found to be significantly lower in the group of patients with PV than in the control individuals (Figure). This suggests that the weak suppressor activity may allow the development of the increased B-cell activity and, together with other factors, might play a role in the pathogenesis of this disease.

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